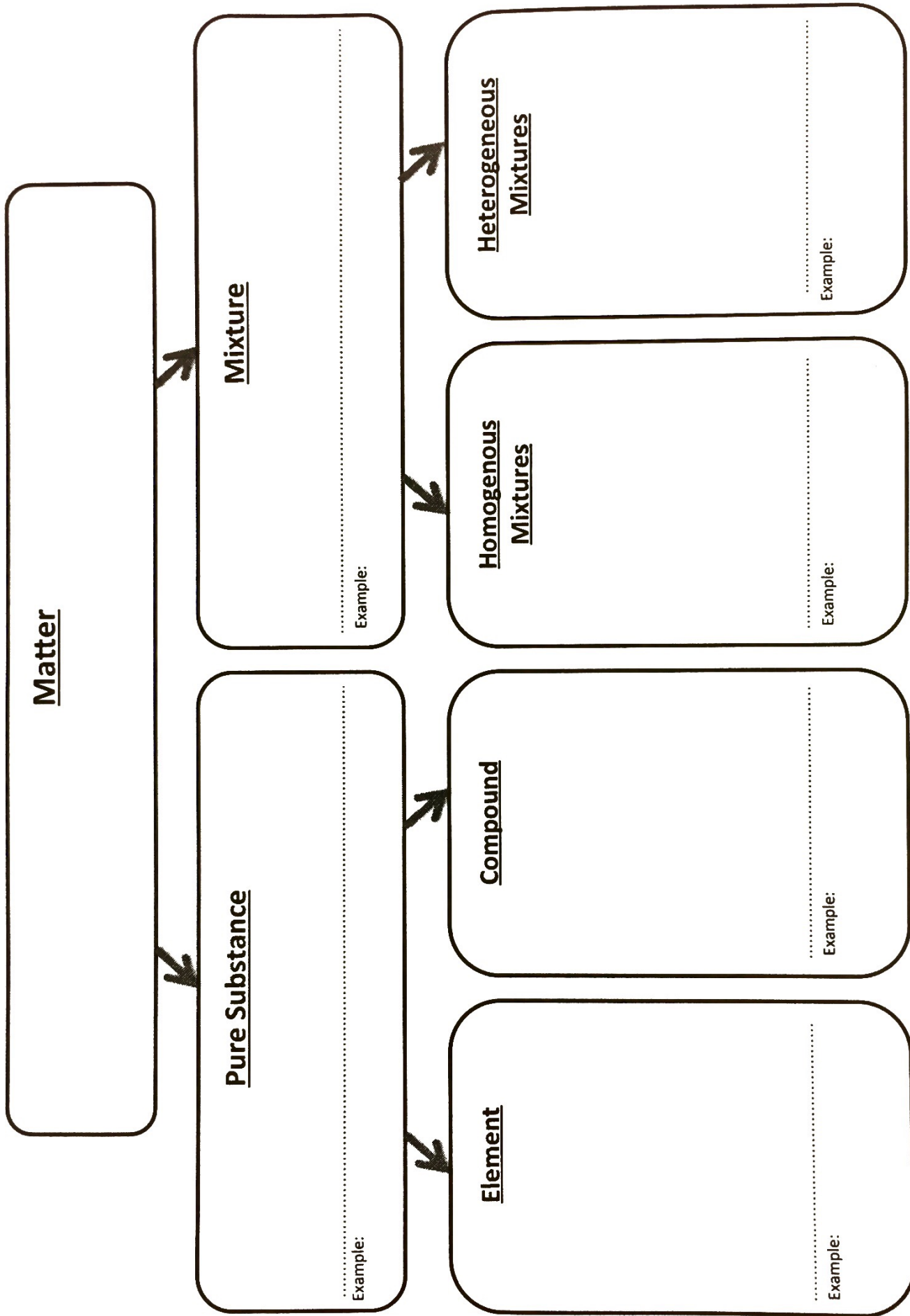


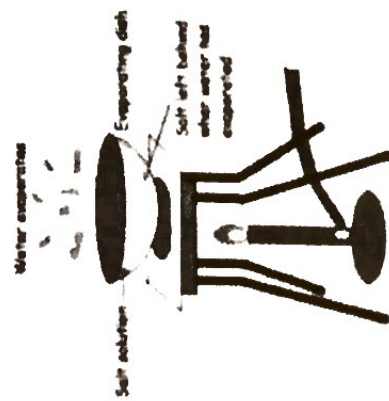
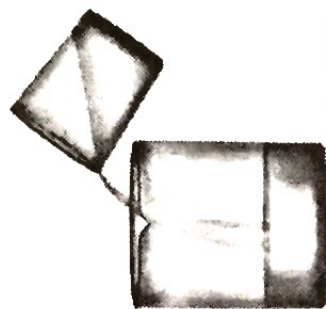
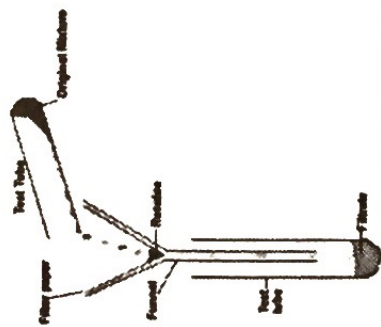
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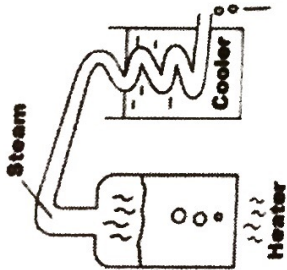
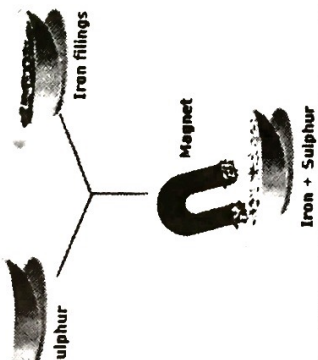
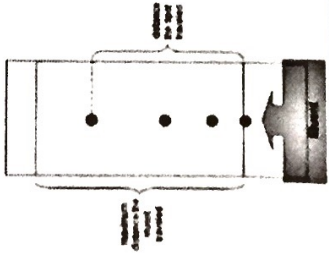
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# Classification of Matter





Separation Technique	Separates What From What?	How It Works	Example
 <p>Steam</p> <p>Cooler</p> <p>Heater</p>			
 <p>Sulphur</p> <p>Iron filings</p> <p>Magnet</p> <p>Iron + Sulphur</p>			
 <p>Sand</p> <p>Water</p> <p>Decantation</p>			

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

## Classification of Matter Lab

### Purpose

To demonstrate the properties of three types of matter.

### Introduction

All matter is constructed of atoms. Atoms are the basic building blocks for everything around you. By combining atoms in different ways, you get different matter with different properties. This activity will help you understand the three types of matter – **Elements**, **compounds** and **mixtures**. In the set of plastic boxes that you will receive, each object (beads of different shapes, sizes and colors) represent a type of atom. Beads grouped together with string create a molecule. **DO NOT TO TRY TO OPEN THE BOXES.**

Matter is classified as a **pure substance** when all of the molecules (particles) are the same.

Matter is classified as a **mixture** if there are different molecules present.

**Elements** are defined as substances made up of only one type of atom. **Compounds** are defined as substances made from 2 or more types of atoms bonded together. Compounds can only be separated by chemical means.

### Procedure

1. Working with your lab partner, write a description of the beads inside your box.
  - a. You should count the beads, look at the color, and determine whether they are single beads or multiple beads.
  - b. Draw the beads in the area shown.
  - c. Since it is difficult to write down all of the characteristics of the beads in each box, you and your partner are to come up with a shorthand description of what you see. For example, if you see 8 Red and 7 Green beads together, you might want to write "8R+7G."
2. You will be given eight more boxes containing beads.
3. Continue to describe them in the same fashion on your data table.
4. When you have counted, described and written shorthand codes for all eight boxes, put them back into their baskets and wait for more instructions.

# Data Table

Box #	Description of Contents (# of beads and colors)	Abbreviation for Beads	Drawing	Type of Matter (element, compound, mixture of elements, mixture of compounds, or mixture of elements and compounds)
1				
2				
3				
4				
5				
6				
7				
8				
9				

Draw a picture using colored pencils or markers to represent each type of matter you observed.

<i>Element</i>	<i>Compound</i>	<i>Mixture of elements</i>	<i>Mixture of compounds</i>	<i>Mixture of elements and compounds</i>

Look at the codes that you created for the contents of each box.

1. How are the mixture codes different from the pure substance codes?
2. How are the compound codes different from the element codes?

Use the following table to answer questions 3-5.

<b>Elements</b>	<b>Compounds</b>	<b>Mixtures</b>
Gold: Au	Carbon Dioxide: CO <sub>2</sub>	Salt water: H <sub>2</sub> O & NaCl
Sodium: Na	Sugar: C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>	Milk: C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> & H <sub>2</sub> O & C <sub>50</sub> H <sub>102</sub> O <sub>3</sub>
Carbon: C	Glass: SiO <sub>2</sub>	Granite: SiO <sub>2</sub> & KAlSi <sub>3</sub> O <sub>8</sub>
Hydrogen: H	Auto Battery Acid: H <sub>2</sub> SO <sub>4</sub>	
Chlorine: Cl	Salt: NaCl	
Silver: Ag	Drain Cleaner: NaOH	

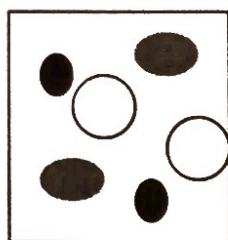
3. Write down at least two rules for how chemical formulas are written.
4. Which of the substances can be separated into two or more pure substances?
5. Which of the substances can only be separated by chemical means? How do you know?
6. Which substances cannot be separated?

Name: \_\_\_\_\_

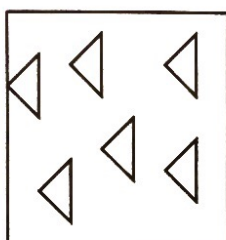
Period \_\_\_\_\_

Date \_\_\_\_\_

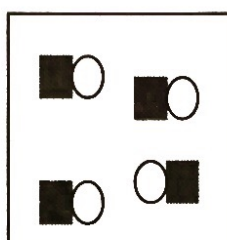
## Elements, Compounds, and Mixtures



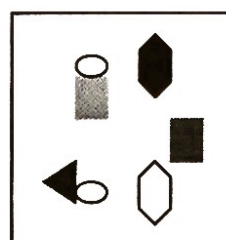
A



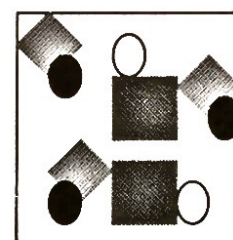
B



C



D



E

Match the particle diagrams above with the correct description:

- |                                     |       |
|-------------------------------------|-------|
| 1. Element                          | _____ |
| 2. Compound                         | _____ |
| 3. Mixture of elements              | _____ |
| 4. Mixture of compound              | _____ |
| 5. Mixture of elements and compound | _____ |

Answer the following questions:

- How many different elements are in diagram A?
- How many different compounds are in diagram E?
- If you broke all of the compounds apart in diagram E, how many different elements would there be?
- Elements and compounds are both considered *pure substances*. What does this mean?

Classify each of the following as elements (E), compounds (C) or Mixtures (M). Write the letter X if it is none of these.

- |                               |                                                           |                    |                |
|-------------------------------|-----------------------------------------------------------|--------------------|----------------|
| ___Diamond (C)                | ___Sugar (C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> ) | ___Milk            | ___Iron (Fe)   |
| ___Air                        | ___Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )        | ___Gasoline        | ___Electricity |
| ___Krypton (K)                | ___Bismuth (Bi)                                           | ___Uranium (U)     | ___Popcorn     |
| ___Water (H <sub>2</sub> O)   | ___Alcohol (CH <sub>3</sub> OH)                           | ___Pail of Garbage | ___A dog       |
| ___Ammonia (NH <sub>3</sub> ) | ___Salt (NaCl)                                            | ___Energy          | ___Gold (Au)   |
| ___Wood                       | ___Bronze                                                 | ___Ink             | ___Pizza       |
| ___Dry Ice (CO <sub>2</sub> ) | ___Baking Soda (NaHCO <sub>3</sub> )                      | ___Titanium (Ti)   | ___Concrete    |

Column A lists a substance. In Column B, list whether the substance is an element (E), a compound (C), a Heterogeneous Mixture (HM), or a Solution (S). (Remember a solution is a homogeneous mixture.) In Column C, list TWO physical properties of the substance.

Column A	Column B	Column C
1. Lucky Charms cereal		
2. Steam		
3. Salt Water		
4. Pencil lead (Pb)		
5. Dirt		
6. Pepsi		
7. Silver (Ag)		
8. Toothpaste (Na <sub>2</sub> HPO <sub>4</sub> )		
9. A burrito		
10. Italian Dressing		
11. Chicken Soup		
12. Lemonade		

## Separation of Mixtures Practice Problems

1. Name the techniques that are suitable for separating the following mixture:

Situation	Separation Technique
1. To obtain drinking water from muddy water	
2. To remove leaves from a swimming pool	
3. To obtain pure sugar from a solution	
4. To determine whether the coloring in a fruit juice is a single substance or a mixture of colored substances	

2. You are asked to separate sand and salt (NaCl). Name the methods needed to carry out the procedure. Explain how you would carry out the procedure to obtain pure sand and salt (NaCl) back.

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3. Ms. Eggleston needs to use distillation to separate a mixture of three liquids. Liquid A has a boiling point of 60 degrees Celsius, Liquid B has a boiling point of 50 degrees Celsius, and Liquid C has a boiling point of 100 degrees Celsius.

Liquid	Boiling Point (in degrees Celsius)
A	
B	
C	

a. First, copy the boiling point of each liquid into the chart below.

b. When Ms. Eggleston heats a beaker of the mixture, which compound will be separated first?

c. Liquid \_\_\_\_\_ (A, B, or C) will be separated first.

d. How do you KNOW? Explain your answer for part c.

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